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EXAMINER	
WEST, JEFFREY R	
ART UNIT	**PAPER NUMBER**
2857	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/708,799	YAU, WEI-GUAN	
	Examiner	Art Unit	
	Jeffrey R. West	2857	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 26 July 2007.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1,3-13 and 15-34 is/are pending in the application.

4a) Of the above claim(s) 7,8,10,24,25 and 27 is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1,3-6,9,11-13,15-23,26 and 28-34 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 26 May 2004 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 18-20, 22, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,084,441 to Kawai in view of U.S. Patent No. 6,141,296 to Progar.

With respect to claim 18, Kawai discloses a timer system comprising an imprecise timer for repeatedly triggering a reference event according to a predetermined time interval (column 7, lines 30-38 and column 8, lines 25-46), a first storage unit for storing a threshold value (column 9, lines 48-52 and 59-61), a second storage unit for storing a count value corresponding to a plurality of reference events generated from the timer (column 9, lines 59-61), a tracking module electrically connected to the timer for tracking at least a first actual time interval between a first reference event and a second reference event occurring after the first reference event (column 7, lines 54-55 and 59-64 and column 8, lines 7-8), a calculating module electrically connected to the tracking module for calculating a compensation value corresponding to the predetermined time interval and one of the actual time interval (column 8, lines 5-10), and a compensating module electrically connected to the calculating module and at least one of the first and second storage

units for reducing a difference between the count value and the threshold value utilizing at least a first compensation value, corresponding to the first actual time interval between the first reference event and the second reference event (column 10, lines 4-22) wherein if the count value reaches the threshold value, the tracking module stops tracking and outputs the desired signal (column 10, lines 24-28).

With respect to claim 19, Kawai discloses a decision logic inherently electrically connected to the first and second storage units for generating an acknowledgement event if the count value reaches the threshold value (i.e. comparing the stored count value to the corrected and stored threshold value) (column 10, lines 24-28).

With respect to claim 20, Kawai discloses that the first and second storage units, the calculating module, compensating module, and the decision logic are positioned within a microprocessor, and the timer is driven by the microprocessor (column 7, lines 30-58 and Figure 2).

With respect to claim 22, Kawai discloses that the compensating module determines the compensation value by calculating a ratio of the actual time interval to the predetermined time interval (column 8, lines 5-10).

With respect to claim 29, Kawai discloses that the reference events are system interrupts of the timer system (column 7, lines 59-64).

Kawai further discloses that the tracking module comprises a clock generator for generating a reference clock and the tracking module utilizes the reference clock for computing a time value corresponding to the actual time interval between every two adjacent reference events (column 7, lines 31-38 and line 59 to column 8, line 4).

As noted above the invention of Kawai teaches many of the features of the claimed invention and while the invention of Kawai does teach tracking an actual time interval between each of the reference events to calculate a compensation value that is used for reducing a difference between the count value and the threshold value, Kawai does not specifically indicate that the actual time interval between each of the reference events is used to calculate a plurality of compensation values for a selectively tracked plurality of actual time intervals, each compensation value corresponding to the predetermined time interval and one of the actual time intervals.

Progar teaches a time-of-day clock assembly having means for correcting imprecision of a timer repeatedly triggering interrupts (column 1, lines 4-7 and column 3, lines 25-37) comprising selectively tracking a plurality of actual time intervals between each of the interrupts according to a count value (column 5, line 63 to column 6, line 9 and column 6, lines 24-32), each actual time interval corresponding to an actual time between a first interrupt and a second interrupt occurring after the first interrupt (column 6, lines 5-9), calculating a plurality of compensation values, each compensation value corresponding to the predetermined time interval and one of the actual time intervals (column 6, lines 9-22), and utilizing each compensation value to form a dynamically calculated compensation value by accumulating a plurality of actual time intervals corresponding to a plurality or reference events for reducing the difference between the actual timer value and a desired timer value (column 5, lines 19-58 and column 6, lines 24-51).

It would have been obvious to one having ordinary skill in the art to modify the invention of Kawai to specify that the actual time interval between each of the reference events is used to calculate a plurality of compensation values for a selectively tracked plurality of actual time intervals, each compensation value corresponding to the predetermined time interval and one of the actual time intervals, as taught by Progar, because while the invention of Kawai only calculates one compensation value thereby only correcting the associated reference event count once, the combination, as suggested by Progar, would have improved the invention of Kawai by providing repeated updating of the count value to provide increased and continuous accuracy and allowing more precise updating and overall operational efficiency through the determination and accumulation of fraction error values over user desired time intervals (column 1, lines 41-53, column 5, lines 1-17 and column 5, line 59 to column 6, line 4) while also allowing the system to selectively track the time interval for fractional error correction based on a desired time thereby providing more user flexibility and control (column 4, line 63 to column 6, line 9 and column 6, lines 24-32).

Further, since the invention of Kawai stops the interval tracking and outputs the signal/acknowledgement when the threshold is reached (Kawai, column 10, lines 24-28) and the invention of Progar teaches selectively tracking a plurality of actual time intervals between each of the interrupts according to a count value (column 5, line 63 to column 6, line 9 and column 6, lines 24-32), each actual time interval corresponding to an actual time between a first interrupt and a second interrupt

occurring after the first interrupt (column 6, lines 5-9), calculating a plurality of compensation values, each compensation value corresponding to the predetermined time interval and one of the actual time intervals (column 6, lines 9-22), and utilizing each compensation value to form a dynamically calculated compensation value by accumulating a plurality of actual time intervals corresponding to a plurality or reference events for reducing the difference between the actual timer value and a desired timer value (column 5, lines 19-58 and column 6, lines 24-51), the combination would have continued to apply first, second, etc. compensation values ,for first, second, etc. intervals, to the count value for reducing the difference between the count value and the threshold value until it is determined that the count value reaches the threshold value.

3. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawai in view of Progar and further in view of U.S. Patent No. 3,889,189 to Lode.

As noted above, the invention of Kawai and Progar teaches many of the features of the claimed invention and while the invention of Kawai and Progar does teach that the tracking module comprises a clock generator for generating a reference clock and the tracking module utilizes the reference clock for computing a time value corresponding to the actual time interval between every two adjacent reference events (Kawai; column 7, lines 31-38 and line 59 to column 8, line 4), and while one having ordinary skill in the art would understand the necessity to reset a time value

before measuring subsequent time intervals, the combination does not explicitly teach this feature.

Lode teaches a digital time measurement system comprising a counter for tracking an actual time interval including a method for resetting an existing time value before tracking the actual time interval (column 60, lines 51-56).

It would have been obvious to one having ordinary skill in the art to modify the invention of Kawai and Progar to explicitly teach resetting the time value before tracking an actual time interval, as taught by Lode, because, as suggested by Lode and considered well-known in the art, the combination would have insured that the newly measured interval is accurate by clearing any time value remaining from a previously measured interval which would skew results (column 60, lines 51-56).

4. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawai in view of Progar and further in view of U.S. Patent No. 4,374,358 to Hirose.

As noted above, the invention of Kawai and Progar teaches many of the features of the claimed invention and while the invention of Kawai and Progar does teach that the compensating module determines the compensation value by calculating a ratio of the actual time interval to the predetermined time interval (Kawai; column 8, lines 5-10), the combination does not explicitly include calculating the compensation value as an integer closest to the ratio.

Hirose teaches an apparatus for measuring the oscillation frequency of a voltage controlled oscillator comprising means for multiplying a counter value by a ratio

wherein the ratio is obtained and rounded to a closest integer before multiplying (column 3, lines 42-51).

It would have been obvious to one having ordinary skill in the art to modify the invention of Kawai and Progar to explicitly include calculating the compensation value as an integer closest to the ratio, as taught by Hirose, because the combination of Kawai and Progar does teach applying the compensation value to the threshold value and Hirose suggests that the combination would have provided a sufficiently accurate compensation value while simplifying the processing and threshold determination by using whole numbers (column 3, lines 42-51).

5. Claims 1, 3, 5, 9, 11, and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,084,441 to Kawai in view of U.S. Patent No. 4,903,251 to Chapman.

As noted above, the invention of Kawai teaches many of the features of the claimed invention. Further:

With respect to claim 1, Kawai discloses a method of timing utilizing an imprecise timer, the timer repeatedly triggering a reference event according to a predetermined time interval (column 7, lines 30-38 and column 8, lines 25-46), the method comprising the steps of storing a threshold value (i.e. numerical limit value) (column 9, lines 48-52), storing a count value corresponding to a plurality of reference events generated from the timer (i.e. count of clock pulses) (column 9, lines 59-61), tracking a first actual time interval between a first reference event and a second reference

event occurring after the first reference event (column 7, lines 54-55 and 59-64 and column 8, lines 7-8), calculating a first compensation value corresponding to the predetermined time interval and the first actual time interval (column 8, lines 5-10), applying the first compensation value to the threshold value for reducing a difference between the count value and the threshold value (column 10, lines 4-22) and generating an acknowledgement event if the count value reaches the threshold value (column 10, lines 24-28).

With respect to claim 3, Kawai discloses that the step of tracking the actual time interval further comprises tracking the actual time interval between every two adjacent reference events (column 7, lines 59-64 and column 9, lines 16-19).

With respect to claim 5, Kawai discloses that the step of calculating a first compensation value further comprises determining the first compensation value by calculating a ratio of the first actual time interval to the predetermined time interval (column 8, lines 5-10).

With respect to claim 12, Kawai discloses that the reference events are system interrupts (column 7, lines 59-64).

Kawai discloses a method of timing utilizing an imprecise timer, the timer repeatedly triggering a reference event (column 7, lines 30-38 and column 8, lines 25-46), the method comprising the steps of storing a threshold value (i.e. numerical limit value) (column 9, lines 48-52) and a count value (i.e. count of clock pulses) (column 9, lines 59-61), tracking at least a first actual time interval between a first reference event and a second reference event occurring after the first reference

event (column 7, lines 54-55 and 59-64 and column 8, lines 7-8), updating the threshold value (column 10, lines 4-22) according to a first value corresponding to the first actual time interval (column 8, lines 5-10), and generating an acknowledgement event when the count value reaches the threshold value (column 10, lines 24-28).

Kawai discloses that the step of tracking actual time intervals between every two reference events further comprises utilizing a reference clock for computing a time value corresponding to the actual time interval between every two adjacent reference events (column 7, lines 31-38 and line 59 to column 8, line 4).

As noted above, the invention of Kawai teaches many of the features of the claimed invention and while the invention of Kawai does teach storing a threshold value, storing a count value corresponding to a plurality of reference events generated from the timer, tracking a first actual time interval between a first reference event and a second reference event occurring after the first reference event, calculating a first compensation value corresponding to the predetermined time interval and the first actual time interval, applying the first compensation value to the threshold value for reducing a difference between the count value and the threshold value, and generating an acknowledgement event if the count value reaches the threshold value, wherein when the count value reaches the threshold value, the tracking module stops tracking and outputs the desired signal, the invention of Kawai discloses the compensation of the threshold value to reduce the

difference between the count value and the threshold value rather than maintaining the threshold value and adjusting the count value.

Chapman teaches a method for dynamically compensating for the imprecision of a timer, the timer repeatedly triggering a reference event (column 3, line 64 to column 4, line 19), the method comprising the steps of storing a count value (column 5, lines 52-53), tracking an actual time interval between every two reference events (column 5, lines 27-32), and updating the count value by a value calculated through accumulating a plurality of actual time intervals corresponding to a plurality of reference events (column 5, lines 27-37 and column 6, lines 1-5).

Chapman teaches calculating a compensation value from the predetermined time interval and the actual time interval wherein calculating a compensation value further comprises determining the compensation value by calculating a ratio of the actual time interval to the predetermined time interval (column 5, lines 27-37).

Chapman teaches that the step of utilizing the compensation value comprises individually adding the compensation value to the count value (column 6, lines 1-5) or individually subtracting the compensation value from the count value (i.e. adding a negative) without adjusting a threshold voltage (column 6, lines 31-34) periodically upon receiving an interrupt (column 5, lines 42-50).

Chapman teaches that the step of tracking the actual time interval further comprises tracking the actual time interval between every two adjacent reference events (column 5, lines 27-32).

Chapman teaches that the reference events are system interrupts (column 3, lines 64-68).

It would have been obvious to one having ordinary skill in the art to modify the invention of Kawai to compensate the count value rather than the threshold value, as taught by Chapman, because, as suggested by Chapman, the combination would have determined the difference between the actual fixed time period between interrupts and periodically corrected the corresponding count value to obtain an accurate count value (column 5, lines 27-37 and column 6, lines.1-5). The invention of Kawai compensates the threshold value and assumes that the interrupt interval error will maintain constant until the threshold is met while one having ordinary skill in the art would recognize that the interrupt interval tends to drift over time (See for example, U.S. Patent No. 4,708,491 to Luitje; column 3, lines 53-55). Therefore, by periodically adjusting the count value, as taught by Chapman, the combination would have provided a more accurate timing adjustment in Kawai by obtaining new compensation values on a periodic basis thereby compensating for drift over time.

Further, since the invention of Kawai stops the interval tracking and outputs the signal/acknowledgement when the threshold is reached (Kawai, column 10, lines 24-28) and the invention of Chapman teaches periodically obtaining an interval error and adjusting the count value (column 5, lines 27-37 and 42-50 and column 6, lines 1-5), the combination would have continued to apply first, second, etc. compensation values to the count value for reducing the difference between the count value and

the threshold value until it is determined that the count value reaches the threshold value.

Further still, while Kawai discloses, in column 10, lines 14-28, one example of a compensation value being determined as a fraction due to a compensation value calculated by dividing an ideal value of 1 msec. by a measured value of 1.2 msec. one having ordinary skill in the art would recognize that many situations would exist where an integer rather than a fraction would be calculated, for example, if a measured interval drops from 1 msec to .5 msec, the compensation value would be calculated by dividing 1 msec by .5 msec resulting in an integer value of 2.

6. Claims 26 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawai in view of Progar and further in view of U.S. Patent No. 4,903,251 to Chapman.

As noted above, the invention of Kawai and Progar teaches many of the features of the claimed invention and while the invention of Kawai and Progar does teach storing a threshold value, storing a count value corresponding to a plurality of reference events generated from the timer, tracking a first actual time interval between a first reference event and a second reference event occurring after the first reference event, calculating a first compensation value corresponding to the predetermined time interval and the first actual time interval, applying the first compensation value to the threshold value for reducing a difference between the count value and the threshold value, and generating an acknowledgement event if

the count value reaches the threshold value, wherein if the count value reaches the threshold value, the tracking module stops tracking and outputs the desired signal, the combination discloses the compensation of the threshold value to reduce the difference between the count value and the threshold value rather than maintaining the threshold value and adjusting the count value.

Chapman teaches a method for dynamically compensating for the imprecision of a timer, the timer repeatedly triggering a reference event (column 3, line 64 to column 4, line 19), the method comprising the steps of storing a count value (column 5, lines 52-53), tracking an actual time interval between every two reference events (column 5, lines 27-32), and updating the count value by a value calculated through accumulating a plurality of actual time intervals corresponding to a plurality of reference events (column 5, lines 27-37 and column 6, lines 1-5).

Chapman teaches calculating a compensation value from the predetermined time interval and the actual time interval wherein calculating a compensation value further comprises determining the compensation value by calculating a ratio of the actual time interval to the predetermined time interval (column 5, lines 27-37).

Chapman teaches that the step of utilizing the compensation value comprises individually adding the compensation value to the count value (column 6, lines 1-5) or individually subtracting the compensation value from the count value (i.e. adding a negative) without adjusting a threshold voltage (column 6, lines 31-34) periodically upon receiving an interrupt (column 5, lines 42-50).

Chapman teaches that the step of tracking the actual time interval further comprises tracking the actual time interval between every two adjacent reference events (column 5, lines 27-32).

Chapman teaches that the reference events are system interrupts (column 3, lines 64-68).

It would have been obvious to one having ordinary skill in the art to modify the invention of Kawai and Progar to compensate the count value rather than the threshold value, as taught by Chapman, because, as suggested by Chapman, the combination would have determined the difference between the actual fixed time period between interrupts and periodically corrected the corresponding count value to obtain an accurate count value (Chapman; column 5, lines 27-37 and column 6, lines 1-5). The invention of Kawai and Progar compensates the threshold value and assumes that the interrupt interval error will maintain constant until the threshold is met (Kawai; column 10, lines 23-27) while one having ordinary skill in the art would recognize that the interrupt interval tends to drift over time (See for example, U.S. Patent No. 4,708,491 to Luitje; column 3, lines 53-55). Therefore, by periodically adjusting the count value, as taught by Chapman, the combination would have provided a more accurate timing adjustment in Kawai and Progar by obtaining new compensation values on a periodic basis thereby compensating for drift over time.

7. Claims 13, 15, 17, 30-32, and 34 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Kawai in view of Chapman and further in view of U.S. Patent No. 6,141,296 to Progar.

As noted above the invention of Kawai and Chapman teaches many of the features of the claimed invention and while the invention of Kawai and Chapman does teach tracking an actual time interval between each of the reference events to calculate a compensation value that is used for reducing a difference between the count value and the threshold value and repeatedly applying first, second, etc. compensation values to the count value for reducing the difference between the count value and the threshold value until it is determined that the count value reaches the threshold value, the combination does not explicitly indicate that the actual time interval tracking is selective.

Progar teaches a time-of-day clock assembly having means for correcting imprecision of a timer repeatedly triggering interrupts (column 1, lines 4-7 and column 3, lines 25-37) comprising selectively tracking a plurality of actual time intervals between each of the interrupts according to a count value (column 4, line 63 to column 6, line 9 and column 6, lines 24-32), each actual time interval corresponding to an actual time between a first interrupt and a second interrupt occurring after the first interrupt (column 6, lines 5-9), calculating a plurality of compensation values, each compensation value corresponding to the predetermined time interval and one of the actual time intervals (column 6, lines 9-22), and utilizing each compensation value to form a dynamically calculated compensation value by accumulating a plurality of actual time intervals corresponding to a plurality or

reference events for reducing the difference between the actual timer value and a desired timer value (column 5, lines 19-58 and column 6, lines 24-51).

It would have been obvious to one having ordinary skill in the art to modify the invention of Kawai and Chapman to explicitly indicate that the actual time interval tracking is selective, as taught by Progar, because, as suggested by Progar, the combination would have improved the system of Kawai and Chapman by allowing the system to selectively track the time interval for fractional error correction based on a desired time a thereby providing more user flexibility and control (column 4, line 63 to column 6, line 9 and column 6, lines 24-32).

8. Claims 16 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawai in view of Chapman and Progar and further in view of U.S. Patent No. 3,889,189 to Lode.

As noted above, Kawai in combination with Chapman and Progar teaches many of the features of the claimed invention and while the invention of Kawai, Chapman, and Progar does teach that the tracking module comprises a clock generator for generating a reference clock, and the tracking module utilizes the reference clock for computing a time value corresponding to the actual time interval between every two adjacent reference events (Chapman; column 4, lines 20-29, column 5, lines 27-32 and Figure 2), and while one having ordinary skill in the art would understand the necessity to reset a time value before measuring subsequent time intervals, the combination does not explicitly teach this feature.

Lode teaches a digital time measurement system comprising a counter for tracking an actual time interval including a method for resetting an existing time value before tracking the actual time interval (column 60, lines 51-56).

It would have been obvious to one having ordinary skill in the art to modify the invention of Kawai, Chapman, and Progar to explicitly teach resetting the time value before tracking an actual time interval, as taught by Lode, because, as suggested by Lode and considered well-known in the art, the combination would have insured that the newly measured interval is accurate by clearing any time value remaining from a previously measured interval which would skew results (column 60, lines 51-56).

9. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawai in view of Chapman and further in view of U.S. Patent No. 3,889,189 to Lode.

As noted above, the invention of Kawai and Chapman teaches many of the features of the claimed invention and while the invention of Kawai and Chapman does teach that the tracking module comprises a clock generator for generating a reference clock, and the tracking module utilizes the reference clock for computing a time value corresponding to the actual time interval between every two adjacent reference events (Chapman; column 4, lines 20-29, column 5, lines 27-32 and Figure 2), and while one having ordinary skill in the art would understand the necessity to reset a time value before measuring subsequent time intervals, the combination does not explicitly teach this feature.

Lode teaches a digital time measurement system comprising a counter for tracking an actual time interval including a method for resetting the time value before tracking the actual time interval (column 60, lines 51-56).

It would have been obvious to one having ordinary skill in the art to modify the invention of Kawai and Chapman to explicitly teach resetting the time value before tracking an actual time interval, as taught by Lode, because as suggested by Lode, and considered well known in the art, the combination would have insured that the newly measured interval is accurate by clearing any time value remaining from a previously measured interval which would skew results (column 60, lines 51-56).

10. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawai in view of Chapman and further in view of U.S. Patent No. 4,374,358 to Hirose.

As noted above, the invention of Kawai and Chapman teaches many of the features of the claimed invention and while the invention of Kawai and Chapman does teach determining a compensation value as a ratio of the actual time interval and the predetermined time interval (Chapman; column 5, lines 28-36) and applying the compensation value to the count value wherein the count value is an integer (Chapman, column 6, lines 1-5), the combination does not explicitly include calculating the compensation value as an integer closest to the ratio.

Hirose teaches an apparatus for measuring the oscillation frequency of a voltage controlled oscillator comprising means for multiplying a counter value by a ratio

wherein the ratio is obtained and rounded to a closest integer before multiplying (column 3, lines 42-51).

It would have been obvious to one having ordinary skill in the art to modify the invention of Kawai and Chapman to explicitly include calculating the compensation value as an integer closest to the ratio, as taught by Hirose, because the combination of Kawai and Chapman does teach applying the compensation value to the count value wherein the count value is an integer and Hirose suggests that the combination would have provided a sufficiently accurate count value while still obtaining a count value that is a whole number as is expected with regard to interrupt counts and count values in general (column 3, lines 42-51).

Response to Arguments

11. Applicant's arguments with respect to claims 1, 3-6, 9, 11-13, 15-23, 26, and 28-34 have been considered but are moot in view of the new ground(s) of rejection.

The following arguments, however, are noted:

Applicant argues:

> Claim 1 discloses a system for correcting an imprecise timer wherein the system initially only tracks a first time interval and corrects for errors accordingly, then determines if a count value reaches a threshold value after said error correction, wherein if this is true no more tracking of time intervals (and therefore no more error compensation) will occur. In other words, each compensation value corresponding to each time interval is determined separately, and there is no accumulation of error values. Kawai discloses a system wherein a period between interrupt pulses is measured, and compared with a desired period to generate a fractional value. The fractional value is then used to multiply a measured period of a plurality of pulses: "For example, if an ideal value for a period of the second basic clock signal is 1.0 msec and an actual value of the period thereof is 1.2 msec, then the corrective coefficient for the clock timer 14 is

calculated as "1/1.2". The calculated corrective coefficient is then set in the clock timer 14 in step S8. The calculated corrective coefficient is subsequently used to multiply a numerical value up to which clock pulses of the second basic clock signal as the system clock signal are counted by the clock timer 14" [Col.9, lines 16 - 25]. This assumes that the amount by which the actual clock period differs from an ideal period is constant, whereas Claim 1 discloses an imprecise timer, therefore each time period must be tracked and compensated separately. Calculation is selectively performed, thereby saving considerable processing time if only a first compensation value needs to be calculated.

The system disclosed by Chapman is for maintaining timing of an interrupt-driven clock wherein "interrupts (are) separated by a fixed time period" [Col.6, lines 59 - 60]. In this case, the amount of error of each individual time period is determined by dividing a total error value by a number of time intervals. Chapman also discloses accumulating error values and only compensating for errors after said accumulated errors reach a certain predetermined value, wherein said predetermined value is greater than the threshold value: "The present invention performs correction for time keeping inaccuracy only after some amount of error has been allowed to accumulate" [Col.5, lines 12 - 14] and "Some number other than 1,000,000 could be used as long as it were larger than the one minute interval and preferably contained many one minute intervals to obtain the benefits of reduced processor loading and greater resolution of adjustment accuracy" [Col.5, lines 37 - 41]. As Claim 1 discloses an imprecise timer, it is necessary to compensate for each individual time period separately. Moreover, it is possible that only one time period has an associated error value, therefore correction of a single time period is sufficient for correcting the inaccuracy of the timer.

If Kawai were to be combined with Chapman, it would result in a system wherein actual time periods differ from ideal time periods by a fixed value, error values are accumulated over a period of time greater than the threshold value, and only corrected according to when this period of time is reached. Claim 1 describes a method where no errors are accumulated, individual compensation values are only determined according to a comparison between the count value and the threshold value and correction according to each time interval occurs individually.

The Examiner asserts that while Applicant argues that in the claimed invention "there is no accumulation of error values", Applicant has not specifically indicated which of the limitations of claim 1 specify no accumulation of error values.

The Examiner also asserts that while Applicant argues that claim 1 discloses an "imprecise timer" and therefore "it is necessary to compensate for each individual time period separately", Applicant has not specifically indicated why the invention of Kawai does not perform individual time period compensation when Kawai discloses tracking a first actual time interval between a first reference event and a second reference event occurring after the first reference event (column 7, lines 54-55 and 59-64 and column 8, lines 7-8), calculating a first compensation value corresponding to the predetermined time interval and the first actual time interval (column 8, lines 5-10), applying the first compensation value to the threshold value for reducing a difference between the count value and the threshold value (column 10, lines 4-22) and generating an acknowledgement event if the count value reaches the threshold value (column 10, lines 24-28).

Applicant argues:

Additionally, Claim 1 has been amended to include the limitation of "the first compensation value being an integer" and is supported at least by specification paragraph [0031]. In Election/Restriction Office actions for this application dated 10/04/2005 and again on 11/16/2005, the applicant was required to select between two "patentably distinct" species "best illustrated in paragraph 0031, lines 6-11" and "best illustrated in paragraph 0031, lines 11-18". The difference between these two "patentably distinct" species is that in the former species, the compensation value is an integer while in the later species, the compensation value is a floating point.

Presumably included in the Examiner's reasons for these species being "patentably distinct" is an awareness of different real world results depending upon which species was employed in the present application. Kawai clearly uses non-integer coefficients as compensation values (Col.10, lines 18-23, 36-40) and replacing them with integers compensation values would, in the illustrated example (Col.10, lines 14-28), cause the device of Kawai to obviously malfunction. Any modification of a reference that makes it unsatisfactory for its

intended purpose is not obvious (MPEP 2143.01) and Kawai should therefore not be combined with any reference teaching integer coefficients.

The Examiner disagrees with Applicant's assertion that Kawai clearly uses non-integer coefficients as compensation values.. The Examiner notes that column 10, lines 14-28 of Kawai is only one example of a compensation value being determined as a fraction due to a compensation value calculated by dividing an ideal value of 1 msec. by a measured value of 1.2 msec. However, the Examiner notes that many situations exist where an integer rather than a fraction would be calculated, for example, if a measured interval drops from 1 msec to .5 msec, the compensation value would be calculated by dividing 1 msec by .5 msec resulting in an integer value of 2.

Applicant argues:

In Claim 13, compensation values are only determined if a comparison is deemed to be unequal, therefore if the timer is precise for a certain period of time no compensation values are determined, and no time interval is tracked. This therefore significantly saves on calculation processes. Kawai, Chapman, and Progar all claim accumulating error values over a period of time until the error value or the time value is equal to a predetermined threshold, then adding all accumulated error values at one time to correct for the error.

Re the Examiner's comment that Progar selectively tracks time intervals, it should be noted that Progar does not error compensate at this point, and continues to track time intervals until an accumulated error value reaches a predetermined value at which point error compensation will occur: "Each time, in this embodiment, that register 20 outputs a "minute increment signal to register 27, microprocessor 12 generates a fractional error signal representing the time value of the fractional error associated with one minute (i.e., 1,792 microseconds) and selectively outputs this time value to accumulator 22. Accumulator 22 maintains a "running total" of these received fractional error values by sequentially and receivably adding the error value of each of the received fractional error signals to its presently contained value, thereby

> additively updating the contained present value .... once the contained value exceeds a certain threshold value, accumulator 22 generates a signal to microprocessor 12 ...... thereby causing the contained value within the accumulator 22 to be reset" [Col.5, lines 19 - 41]. Therefore, error compensation is not dependent on a comparison between threshold and count value, but only dependent on amount of error detected. Furthermore, Chapman claims a timer wherein each period is fixed (as detailed under response to Claim 1), therefore it is necessary to correct for all time periods. Claim 13 claims an imprecise timer, wherein it is possible that only a first time interval is incorrect, and therefore only correction of the first time interval is required. Such a limitation is not claimed by Kawai, Chapman, or Progar, and therefore applicant believes Claim 13 should be found allowable.

In response to Applicant's argument that in Progar, "error compensation is not dependent on a comparison between threshold and count value, but only dependent on amount of error detected", the Examiner asserts that Progar is only relied upon for explicitly indicating that the actual time interval tracking is selective.

Progar then teaches such a feature by teaching a time-of-day clock assembly having means for correcting imprecision of a timer repeatedly triggering interrupts (column 1, lines 4-7 and column 3, lines 25-37) comprising selectively tracking a plurality of actual time intervals between each of the interrupts according to a count value (column 4, line 63 to column 6, line 9 and column 6, lines 24-32).

The Examiner asserts that with respect to a comparison between a threshold and count value, Kawai discloses a decision logic inherently electrically connected to the first and second storage units for generating an acknowledgement event if the count value reaches the threshold value (i.e. comparing the stored count value to the corrected and stored threshold value) (column 10, lines 24-28).

In response to Applicant's argument that:

> Claim 13 claims an imprecise timer, wherein it is possible that only a first time interval is incorrect, and therefore only correction of the first time interval is required. Such a limitation is not claimed by Kawai, Chapman, or Progar, and therefore applicant believes Claim 13 should be found allowable.

the Examiner asserts that claim 13 does not include any limitations specifying that "only correction of the first time interval is required".

Applicant argues:

> Claim 30 has been amended to further clarify that only if the count value does not equal the threshold value after initial compensation will a second compensation value be determined. In other words, originally, only a first compensation value is determined and applied to the count value, wherein if the count value then equals the threshold value, no more compensation will be required. As neither Kawai, Chapman, nor Progar teach compensating for each individual time period separately, and instead teach accumulating error values over a predetermined period of time greater than adjacent interrupt pulses, the applicant asserts that Claim 30 provides a new unanticipated step to a method for correcting a timer. The advantage of this method of calculation is that errors can be immediately corrected, and less calculation is required, as there is no need to accumulate error values.
>
> ...
>
> Claim 18 has been amended to more explicitly state that if compensation with the first compensation value results in the count value equaling the threshold value then no more compensation values will be calculated. As neither Kawai nor Progar claim compensating for each time interval error separately, and furthermore claim accumulating all errors over a set time period, applicant asserts that Claim 18 overcomes the prior art rejection. This is because neither Kawai nor Progar teach utilizing a comparison between the threshold value and the count value as a means of determining whether to calculate a single error compensation value. Claim 18 claims a system where each error value is calculated and applied individually, and where the calculation of each error value is dependent on the comparison between the threshold value and the count value.

The Examiner asserts that Kawai does teach compensating for each individual time periods separately by teaching a tracking module electrically connected to the timer for tracking at least a first actual time interval between a first reference event and a second reference event occurring after the first reference event (column 7, lines 54-55 and 59-64 and column 8, lines 7-8), a calculating module electrically connected to the tracking module for calculating a compensation value corresponding to the predetermined time interval and one of the actual time interval (column 8, lines 5-10), and a compensating module electrically connected to the calculating module and at least one of the first and second storage units for reducing a difference between the count value and the threshold value (column 10, lines 4-22) wherein if the count value reaches the threshold value, the tracking module stops tracking and outputs the desired signal (column 10, lines 24-28).

The Examiner also maintains that Progar teaches a time-of-day clock assembly having means for correcting imprecision of a timer repeatedly triggering interrupts (column 1, lines 4-7 and column 3, lines 25-37) comprising selectively tracking a plurality of actual time intervals between each of the interrupts according to a count value (column 5, line 63 to column 6, line 9 and column 6, lines 24-32), each actual time interval corresponding to an actual time between a first interrupt and a second interrupt occurring after the first interrupt (column 6, lines 5-9), calculating a plurality of compensation values, each compensation value corresponding to the predetermined time interval and one of the actual time intervals (column 6, lines 9-22), specifically:

For example and without limitation, the present invention may be selectively adapted to accumulate and periodically correct fractional errors occurring or associated with multiple interrupt signals (e.g., two interrupt signals) In such an embodiment, accumulator 22 is initialized to selectively generate an output signal to microprocessor 12 and to reset line 34 only when the value contained within the accumulator 22 equals or exceeds twice the interrupt signal time period.

Frequency counter 28 is selectively, physically, communicatively, and electrically coupled to system clock assembly 16 and measures the frequency of the crystal oscillator 14 and the frequency of the interrupt signals which are output by system clock 16. (column 5, line 63 to column 6, line 9)

Frequency counter assembly 28 compares the actual or measured frequency of the interrupt signals to the "ideal" frequency of the interrupt signals which would occur if the oscillator 14 were performing exactly according to specification (e.g., without "tolerance" type errors).

Counter assembly 28 further and selectively determines an "amount of error" by subtracting the actual signal frequency of the generated interrupt signals from the "specified" or "ideal" signal frequency. This error value is selectively provided to microprocessor 12. In this non-limiting numerical example and/or embodiment, the "ppm error" equals +54.8 microseconds per second or 3288 microseconds per minute (54.8 microseconds per second.times.60 seconds per minute). (column 6, lines 9-22)

Calibration error accumulator 24 selectively corrects this calibration error after the cumulative and/or additive error reaches a certain predetermined amount or level. That is, in operation, each time that register 20 outputs a "minute increment" signal to clock 26, microprocessor 12 generates a calibration error signal representing the "time value" of the calibration error associated with one minute of time (e.g., 3,288 microseconds), and selectively outputs this value to accumulator 24. (column 6, lines 24-32)

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to Applicant's disclosure:

U.S. Patent No. 4,708,491 to Luitje teaches a time of day clock wherein interrupt intervals tend to drift over time.

U.S. Patent No. 6,397,283 to Ting teaches a method of automatically adjusting interrupt frequency.

U.S. Patent No. 4,407,589 to Davidson et al. teaches an error correction method and apparatus for electronic timepieces.

U.S. Patent No. 4,400,093 to Jaunin teaches a method for inspecting the running of a timepiece.

U.S. Patent No. 4,282,595 to Lowdenslager et al. teaches a method for digital frequency trimming an oscillator in an electronic timepiece.

U.S. Patent No. 6,981,165 to Marik teaches a method and apparatus for handling an interrupt from a real-time clock to increment a program clock.

U.S. Patent No. 5,392,435 to Masui et al. teaches a microcomputer having a system clock frequency that varies in dependence on the number of nested and held interrupts.

U.S. Patent No. 5,535,380 to Bergkvist, Jr. et al. teaches a system to reduce latency for real time interrupts.

U.S. Patent No. 4,093,873 to Vannier et al. teaches a method for compensating digital counters for quartz crystal oscillators.

U.S. Patent No. 5,325,313 to Herbert et al. teaches a system for measuring timepiece beat interval accuracy.

U.S. Patent No. 4,896,321 to Kawahara teaches a self-monitoring system including a timer for determining the processing time of a unit (abstract), the timer/counter repeatedly triggering a reference event according to a predetermined

time interval (column 3, lines 31-35), the method comprising the steps of storing a threshold value (column 3, lines 1-4), storing a count value corresponding to a plurality of reference events generated from the timer/counter (column 2, lines 5-8 and 42-44), and generating an acknowledgement event if the count value reaches the threshold value (column 3, lines 1-4 and 15-20). Kawahara teaches that the reference events are system interrupts (column 3, lines 31-35). Kawahara further teaches a decision logic electrically connected to the first and second storage units for generating an acknowledgement event (i.e. alarm) if the count value reaches the threshold value (column 3, lines 1-4 and 15-20 and Figure 1).

JP Patent Application Publication No. 10-020052 to Nagaoka teaches a time correction method and device therefor.

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing

date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrey R. West whose telephone number is (571)272-2226. The examiner can normally be reached on Monday through Friday, 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eliseo Ramos-Feliciano can be reached on (571)272-7925. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jeffrey R. West
Primary Examiner
Art Unit – 2857

October 15, 2007